

An Introduction to the NIST Assessment of The U.S. Measurement System

Dennis A. Swyt
Director, USMS Project



National Institute of Standards and Technology
Technology Administration, U.S. Department of Commerce

- The nation's measurement system (the USMS) is the complex of all the people and institutions, private and public, that make, use, or serve to insure the validity of those measurements
- Measurements are carried out across the entire spectrum of the economic activity, from business, trade, and commerce, through medicine and health care, to government and defense
- Everyone in the U.S., each of us, depends upon measurements every day
- No single institution and no individual has responsibility or authority over the system that produces the measurements upon which we all depend

- NIST is the U.S.'s National Measurement Institute and is responsible for the U.S. national standards of physical measurement
- In that capacity it has accepted the challenge to take a look to see whether the U.S.'s measurement system is meeting the nation's measurement needs
- This presentation describes briefly how NIST is going about that assessment and what it expects from it

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Objective of USMS Effort

An assessment of the USMS means taking a look at the nation's measurement system as a whole and making a judgment of the quality of the state that it is in

NIST had said that it would do such an assessment by next summer

To that end NIST established an objective to produce by June 2006 a NIST report on a needs-based assessment of the state of the USMS

Logic of the USMS Effort and Report

Technology is a foundation of the U.S.'s economy and defense

Innovation in technology is a major source of the nation's economic well-being and military strength

Technological innovation is a basis for increased competitiveness, productivity, and quality

Logic of the USMS Effort and Report

Technological innovation is
the introduction into the marketplace of new technology

This technological innovation may be
a product incorporating new technology or
a process (for producing products) incorporating new technology

Logic of the USMS Effort and Report

Most of U.S. industry's most critical needs in measurements are linked to technological innovation

These measurement needs arise from measurement problems associated with the creation, production, marketing, and effective use of new product and process technologies

It is a primary function of the U.S. measurement system to deliver measurements that meet U.S. industry needs

Logic of the USMS Effort and Report

An assessment of the state of the USMS can well begin then with a broad survey of industry measurement needs relative to technological innovation

From the results of this survey, inferences may be drawn about the overall state of the USMS and an assessment made

The report is to provide the results of such a survey and the assessment based upon it

Fit with NIST of the Focus of the NIST USMS Effort on Technological Innovation

NIST as the National Institute of Standards and Technology was established by the Technological Competitiveness Act of 1988

The NIST USMS effort had been initiated with the proposition that *the USMS is a key component of the US infrastructure for innovation*

The new NIST Director has stated the mission of NIST to be *to support U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology*

He has established as the first of the NIST strategies for success *to help the U.S. to drive and take advantage of the increased pace of technological change*

This NIST assessment of the USMS with its focus on *measurement barriers to technological innovation* is a principal element of that strategy

Basic Methodology of the Assessment

- Focus on measurement problems that pose technical barriers to technological innovation
- Survey the space of these measurement needs from different perspectives
- Use industry-need workshops, industry technology roadmaps and other fact-finding techniques to identify measurement needs
- Draw inferences about the system from the identified needs
- Confirm results outside of NIST

The Datum of Input to the USMS Assessment An Industry Measurement Need (MN)

Information	Technological innovation at stake Economic significance of the innovation Technical barrier to the innovation Stage of innovation at which technical barrier appears Measurement-problem part of the technical barrier Potential solutions to the measurement problem Potential providers of these solutions Government role, if any, in these solutions
Format	One page, crafted, with documented support

Information Sources and Producers of USMS-Assessment Measurement Needs

Measurement Needs may be produced *from* information

- generated by a workshop, NIST-USMS or not, during or after the event
- synthesized from industry technology roadmaps, technology assessments, or technical reports
- compiled from surveys or interviews by any medium: letter, email, or phone

Measurement Needs may be produced *by*

- groups or individuals
- members of NIST
- agents of NIST, such as contractors, or
- persons not affiliated with NIST in
 - industry
 - universities
 - government

Surveying the Space of Industry Measurement Needs

To achieve a broad survey of measurement needs,
the approach is to look at the overall space of measurement needs
from different perspectives, that is, from different bases,
at the same time in parallel

The Bases for the Survey of the Space of Measurement Needs

Sectors	Semiconductor, Automotive, Software
Technologies	Broad (including Nanotechnology, Bio-/Medical Imaging, Disaster First-Responder) and Discrete (including Workshop Topics)
Disciplines	Physics, chemistry, material science, electrical engineering, civil-mechanical engineering, manufacturing engineering, computer-IT sci-eng
SI Units	Mass, Length, Time, Electrical Quantities, Temperature, Amount Substance, Luminous Intensity

Output of the NIST Assessment of the USMS

The output of this NIST assessment of the USMS will be a June 2006 report to industry and other stakeholders that will include

- The specific technological-innovation-limiting measurement needs that it identifies
- Its findings on measurement needs, systemic problems, and the state of the USMS and
- The follow-up actions it will take to facilitate achievement of solutions
 - to the specific needs identified and
 - to any systemic problems discovered

Intended Effects of Assessment Report

The intended effect of the Assessment report will be to:

- Allow potential providers of solutions to specific measurement problems to be engaged and mobilized
- Bring the attention of stakeholders to bear on systemic issues in the functioning of the U.S. measurement system as a whole
- Serve as a catalyst for the identification of other industry needs and other possible systemic problems

Conclusion

- Technological innovation is a major source of the nation's economic well-being and military strength
- Unsolved measurement problems pose technical barriers to technological innovation
- NIST is assessing the state of the nation's measurement system in terms of measurement barriers to technological innovation
- This brief presentation has been given to let you know how NIST is going about that assessment and what you might expect from it